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Attorney Docket 8040-1016
PATENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of

Toshiyuki HIROTA — Appeal No. _____

Serial No. 09/939,672 — GROUP 2878

Filed August 28, 2001 — Examiner Thanh X. LUU

SEMICONDUCTOR DEVICE PACKAGE HAVING A SWITCHER CONNECTING PLURAL PROCESSING ELEMENTS

**APPEAL BRIEF**

MAY IT PLEASE YOUR HONORS: October 14, 2004

1. Real Party in Interest

The real party in interest in this appeal is the assignee, NEC Electronics Corporation of Kanagawa, Japan.

2. Related Appeals and Interferences

Neither the appellant, the appellant's representative nor the assignee know of any other prior and pending appeals, interferences or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

3. Status of the Claims

Claims 1, 3-5, 7-9, 11-14 and 16 are pending, from whose final rejection this appeal is taken. Claims 2, 6, 10, 15 and 17-18 are cancelled.

4. Status of Amendments

Subsequent to the March 25, 2004 final rejection, Applicant filed an Amendment After Final Rejection on July 13, 2004, which was entered for purposes of Appeal.

5. Summary of Claimed Subject Matter

The invention relates to a large-scale integration (LSI) semiconductor device having a plurality of processing elements and a switcher connecting each of the processing elements to each other.

As is known from the disclosure on page 6, lines 2-5 in conjunction with Figure 1, a first known LSI system includes a core processor 701 and a plurality of peripheral processors 702, 703, located on a single chip. As further disclosed on page 6, lines 15-19, the peripheral processors 702, 703 are connected to the core processor through a peripheral bus 724.

As is also known from the disclosure on page 6, lines 18-24 in conjunction with Figure 2, a second known LSI system includes a plurality of LSIs 810. Each of the plurality of LSIs includes a microcomputer 811 and a communication interface 812. Each communication interface 812 is connected to other communication interfaces through a network bus 820.

However, as stated on page 2, lines 17-22 a problem exists with the first conventional LSI system in that since the wiring is over multilayers, the wiring is complex and requires an

expensive redesign if even one of the processors is changed. An additional problem with the first conventional LSI system as disclosed on page 12, lines 16-20 is that the length of the wires causes unwanted delays.

As disclosed on page 3, lines 1-3, a problem exists with the second conventional LSI system due to the complexity of the wiring and as disclosed on page 12, lines 21-24 a problem exists with the second conventional LSI system based on the number of transmission lines, which leads to undesired cross talk.

The invention overcomes these problems by providing a plurality of processing elements connected to each other by a central switcher as disclosed on page 3, line 24 through page 4, line 8 in conjunction with Figure 3. In addition as disclosed on page 4, lines 11-13, one of the processing elements and the switcher can be connected to each other by peer-to-peer connection.

As disclosed on page 4, lines 7-8, having a central switcher connecting each of the processing elements to each other enables a length of the connection lines between elements to be minimized. Accordingly, the delays in processing are reduced. As disclosed on page 8, line 26 through page 9, line 5, having a switcher connect a plurality of processors through a transmission line enables signals and data to be transmitted through the transmission line using peer-to-peer connection. Accordingly, the

number of transmission lines may be reduced to one or two.

The invention defined in independent claim 1 is an LSI semiconductor device having a single switcher that connects each of plural processing elements to each other. One of the plural processing elements and the single switcher are connected by peer-to-peer connection via at least one transmission line as disclosed on page 9, lines 1-5.

Independent claim 14 is also a device claim that includes similar features to claim 1 except each of the plural processing elements are LSI processing elements. Accordingly, only where the claims differ will separate arguments be set forth.

6. Grounds of Rejection to be Reviewed on Appeal

Claim 8 stands rejected under the written description requirement of §112, first paragraph.

Claims 1, 3-5, 7, 13 and 14 stand rejected under §102(e) as being anticipated by WINEGARDEN et al. 6,467,009.

Claims 1, 3-5, 7 and 13 stand rejected under §102(e) as being anticipated by NGUYEN et al. 6,154,051.

Claims 9, 11 and 12 stand rejected under §103(a) as being obvious over WINEGARDEN et al.

7. Arguments

Arguments Concerning the First Ground of Rejection

Claim 8 stands rejected under the written description requirement of §112, first paragraph.

The Examiner asserts that "Applicant has failed to describe an embodiment having a peer-to-peer connection via a transmission line in combination with having optical communication between the processing elements".

To satisfy the written description requirement, an applicant must convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention, and that the invention, in that context, is whatever is now claimed.

At the time of filing, claim 1 recited in relevant part: "a plurality of processing elements; and a switcher which connects each of the elements to each other". Original claim 6 which depended from claim 1 provided that "one of the processing elements and the switcher are connected by peer-to-peer connection via at least one transmission line".

By the amendment of July 30, 2003 claim 1 was amended to include claim 6. By this same amendment, claim 8, which also depends from claim 1, was amended as to form to address claim objections noted in the Office Action of March 31, 2003. Claim 8 was also amended as to form to present consistent claim language in each of the claims.

Claim 8 recites that each of the at least one of the plural processing elements and the single switcher has a light emitting element and a light receiving element. Claim 8 further recites that optical communication is performed between the at

least one of the plural processing elements and the single switcher.

These recitations provide that communication between one of the processing elements and the switcher can be through a peer-to-peer connection (hierarchy) via at least one transmission line (claim 1) and communication between one processing element and the switcher can be through optical communication (medium-claim 8).

These originally presented embodiments address different parameters, and there is no reason to exclude a combination of the hierarchy (peer-to-peer) and the medium (optical). Accordingly, applicant believes that he has conveyed with reasonable clarity to those of ordinary skill in the art that he was in possession of the invention at the time of filing and that there is support for a given switcher wherein one processing element has a peer-to-peer relationship with that switcher and one processing element uses an optical communication medium with that same switcher. Therefore, the rejection of claim 8 under §112, first paragraph should be withdrawn.

Arguments Concerning the Second Ground of Rejection

Claims 1, 3-5, 7, 13 and 14 stand rejected under §102(e) as being anticipated by WINEGARDEN et al. 6,467,009.

Claim 1 recites a single switcher that connects each of plural processing elements to each other. Claim 1 further provides that one of the plural processing elements and the

single switcher are connected by peer-to-peer connection via at least one transmission line.

The Examiner takes the position that WINEGARDEN et al. teaches a peer-to-peer connection. Specifically, the Examiner states that the two-way arrows between the Central Processing Unit 220 and the Bus and Arbiter 225 as shown in Figure 2 of WINEGARDEN et al. indicates bi-directional communication. The Examiner then concludes that such bi-directional communication is a peer-to-peer connection.

However, such conclusion that bi-directional communication is necessarily a peer-to-peer connection is unfounded. Bi-directional communication can take many different forms including but not limited to peer-to-peer, master/slave and client/server.

Column 4, lines 30-54 of WINEGARDEN et al., which describes Figure 2 discloses bi-directional communication in a master/slave configuration, wherein the system resources to the left of the bus 225 are masters and those to the right of the bus 225 are slaves.

As part of the Amendment After Final Rejection filed on July 13, 2004, Applicant submitted a definition of peer-to-peer as defined by SearchNetworking.com. SearchNetworking.com defines peer-to-peer as a communication model in which each party (processing element) has the same capabilities and either party (processing element) can initiate or complete any supported

transaction, *e.g.* a communication session. Other models with which peer-to-peer might be contrasted include the client/server model and the master/slave model. A copy of the SearchNetworking.com definition is provided in the Evidence Appendix.

WINEGARDEN et al. does not expressly describe a peer-to-peer connection. In addition, the bi-directional communication of WINEGARDEN et al. cannot be peer-to-peer, because a master/slave connection is contrasted with a peer-to-peer connection.

It has been held that: "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference." *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

WINEGARDEN et al. do not expressly describe each and every element of claim 1. Since a master/slave connection is contrasted with a peer-to-peer connection, such connection cannot inherently be a peer-to-peer connection. Therefore, WINGARDEN et al. do not anticipate claim 1.

Claims 3-5, 7, 9 and 13 depend from claim 1 and further define the invention and are also believed to be patentable over WINEGARDEN et al., at least by virtue of their implicit recitation of a peer-to-peer connection.

Independent claim 14 differs from claim 1 in that the plural processing elements of claim 14 are specifically recited as "LSI peripheral input/output processing elements". However, like claim 1, claim 14 recites that one of the plural processing elements and the single switcher are connected by peer-to-peer connection via at least one transmission line. Because the WINEGARDEN reference fails to disclose a peer-to-peer connection between plural processing elements and a single switcher as recited in claim 1, it necessarily fails to show such connection for the specific LSI peripheral input/output processing elements as recited in claim 14.

Arguments Concerning the Third Ground of Rejection

Claims 1, 3-5, 7 and 13 stand rejected under §102(e) as being anticipated by NGUYEN et al. 6,154,051.

Claim 1 recites a single switcher that connects each of plural processing elements to each other. Claim 1 further provides that one of the plural processing elements and the single switcher are connected by peer-to-peer connection via at least one transmission line.

The Examiner takes the position that NGUYEN et al. teaches a peer-to-peer connection, as represented by the double-ended arrows between the Common Control 150 and the logic blocks 141-144 as shown in Figure 1A of NGUYEN et al.

As with the prior anticipation rejection, the Examiner concludes that double-ended arrows identify peer-to-peer communication.

However, as set forth above with respect to the analysis of the WINEGARDEN reference, double-ended arrows indicate no more than bi-directional communication. Whereas the bi-directional communication takes the form of a master/slave model in WINEGARDEN, the double-ended arrows of NGUYEN et al. appear to indicate a client/server model, wherein the server is control section 150 and the clients are logic blocks 141-144. This is no more a peer-to-peer connection than is the master/slave connection of WINEGARDEN.

Applicant asserts that the double-ended arrows of NGUYEN et al. only indicate bi-directional communication and do not indicate a peer-to-peer connection. As NGUYEN et al. do not disclose a peer-to-peer connection, NGUYEN et al. do not anticipate claim 1.

Claims 3-5, 7 and 13 depend from claim and are also believed patentable over NGUYEN et al., at least by virtue of their implicit recitation of a peer-to-peer connection.

Arguments Concerning the Fourth Ground of Rejection

Claims 9, 11 and 12 stand rejected under §103(a) as being obvious over WINEGARDEN et al.

Claims 9, 11 and 12 depend from claim 1 and at least by virtue of their implicit recitation of a peer-to-peer connection are believed to distinguish over WINEGARDEN.

In addition, claim 9 recites that there are a plurality of semiconductor chips each of which includes plural processing elements and a single switcher. Claim 9 further recites that the plural semiconductor chips are connected by at least one inter-switcher.

Claim 11 recites that the inter-switcher is located in one of the plural semiconductor chips. Claim 11 further recites that the plural semiconductor chips are implemented in a plurality of stacked packages.

Claim 12 recites that each switcher of the plural semiconductor chips and the inter-switcher are structured and arranged to have a circuit switching function.

The Examiner's position is that these features are well known in the art and that it would have been obvious to one of ordinary skill in the art to include these features in the apparatus of WINEGARDEN et al. to provide a more integral and compact design.

MPEP §2143 provides: "To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine

reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)."

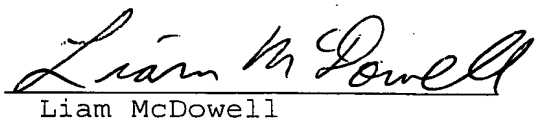
If the Examiner's assertions are true that the features recited in claims 9, 11 and 12 are known in the art, then he should readily be able to obtain a reference or references showing the same. As he has not done so, he has not established a *prima facie* case of obviousness and thus the rejection of claims 9, 11 and 12 under 35 USC §103 should be withdrawn.

In view of the foregoing, it follows that the rejection of claim 8 under 35 USC, first paragraph; the rejection of claims 1, 3-5, 7, 9, 13 and 14 under §102(e) as being anticipated by WINEGARDEN et al.; the rejection of claims 1, 3-5, 7, 9 and 13 under §102(e) as being anticipated by NGUYEN et al.; and the rejection of claims 9, 11 and 12 as unpatentable under §103(a) as obvious over WINEGARDEN et al. are improper and should be reversed.

Reversal of these rejections is accordingly respectfully solicited.

Respectfully submitted,

YOUNG & THOMPSON

By 

Liam McDowell
Attorney for Applicants
Registration No. 44,231
745 South 23rd Street
Arlington, VA 22202
Telephone: 521-2297

8. Claims Appendix

The claims on appeal:

1. An LSI semiconductor device comprising:

a plurality of processing elements; and

a single switcher that connects each of the plural processing elements to each other,

wherein each of the plural processing elements includes a network interface and is connected to the single switcher via the network interface,

wherein the plural processing elements are located at a plurality of sides of the single switcher,

wherein one of the plural processing elements and the single switcher are connected by peer-to-peer connection via at least one transmission line, and

wherein a connection path between said plural processors forms a system LSI.

3. The semiconductor device of claim 1, wherein the switcher is located at the center position of the semiconductor device.

4. The semiconductor device of claim 1, wherein the plural processing elements and the single switcher are implemented in a single semiconductor chip to form a chip LSI.

5. The semiconductor device of claim 1, wherein the plural processing elements and the single switcher are implemented in a single package.

7. The semiconductor device of claim 1, wherein each of the plural processing elements has a function of the same hierarchical level.

8. The semiconductor device of claim 1, wherein at least one of the plural processing elements and the single switcher are located in a space where light is confined, and each of the at least one of the plural processing elements and the single switcher has a light emitting element and a light receiving element, wherein an optical communication is performed between the at least one of the plural processing elements and the single switcher.

9. The semiconductor device of claim 4 further comprising:

a plurality of semiconductor chips each of which includes plural processing elements and a single switcher; and

at least one inter-switcher which connects the semiconductor chips to each other.

11. The semiconductor device of claim 9, wherein the inter-switcher is located in one of the plural semiconductor chips, and the plural semiconductor chips are implemented on a plurality of stacked packages.

12. The semiconductor device of claim 9, wherein each switcher of the plural semiconductor chips and the inter-switcher is structured and arranged to have a circuit switching function.

13. The semiconductor device of claim 1, wherein each of the plural processing elements are only connected to the single switcher, through each respective network interface.

14. An LSI semiconductor device comprising:

a plurality of LSI peripheral input/output processing elements;

a core processor; and

a single LSI switcher that connects each of the plural peripheral processing elements and the core processor to each other,

wherein each of the plural peripheral processing elements and the core processor includes a network interface and are connected to the single switcher via a respective network interface,

wherein the plural processing elements are located around the single switcher, and

wherein one of the plural processing elements and the single switcher are connected by peer-to-peer connection via at least one transmission line.

16. The semiconductor device of claim 8, wherein the light is confined by a sealing resin.

9. Evidence Appendix

- a definition of peer-to-peer communication as defined by searchNetworking.com
- a definition of peer-to-peer communication as defined by a communications engineering course at www.erg.abdn.ac.uk/users/gorry/course/intro-pages/peer-to-peer.html
- a definition of peer-to-peer communication as defined by a Japanese technology paper at www.mstc.or.jp/faop/bs/report/R30adp.PDF

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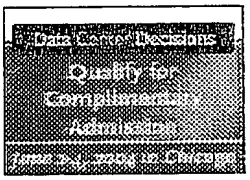

1) Peer-to-peer is a communications model in which each party has the same capabilities and either party can initiate a communication session. Other models with which it might be contrasted include the client/server model and the master/slave model. In some cases, peer-to-peer communications is implemented by giving each communication node both server and client capabilities. In recent usage, peer-to-peer has come to describe applications in which users can use the Internet to exchange files with each other directly or through a mediating server.

IBM's Advanced Peer-to-Peer Networking (APPN) is an example of a product that supports the peer-to-peer communication model.

2) On the Internet, peer-to-peer (referred to as P2P) is a type of transient Internet network that allows a group of computer users with the same networking program to connect with each other and directly access files from one another's hard drives. Napster and Gnutella are examples of this kind of peer-to-peer software. Major producers of content, including record companies, have shown their concern about what they consider illegal sharing of copyrighted content by suing some P2P users.

Meanwhile, corporations are looking at the advantages of using P2P as a way for employees to share files without the expense involved in maintaining a centralized server and as a way for businesses to exchange information with each other directly.

**How Does Internet P2P Work?**

The user must first download and execute a peer-to-peer networking



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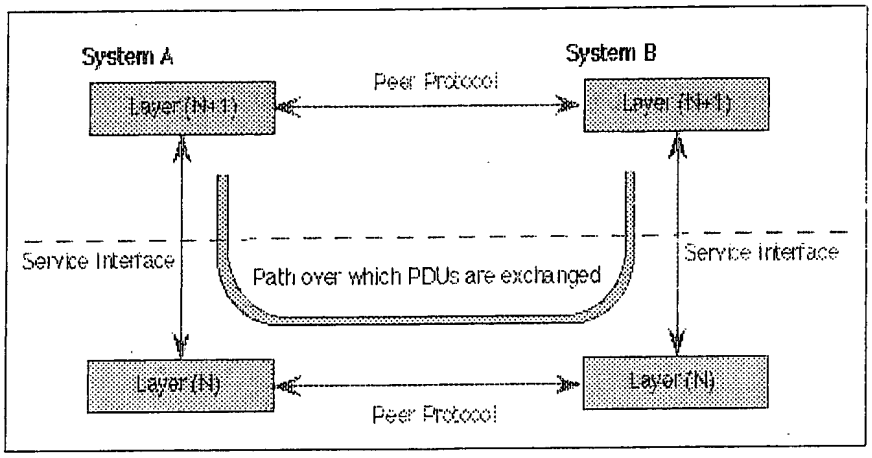
# Peer-to-Peer Communication

Protocol layers may be defined in such a way that the communications within a layer is independent of the operation of the layer being being used. This is known as "peer-to-peer" communication and is an important goal of the OSI Reference Model.

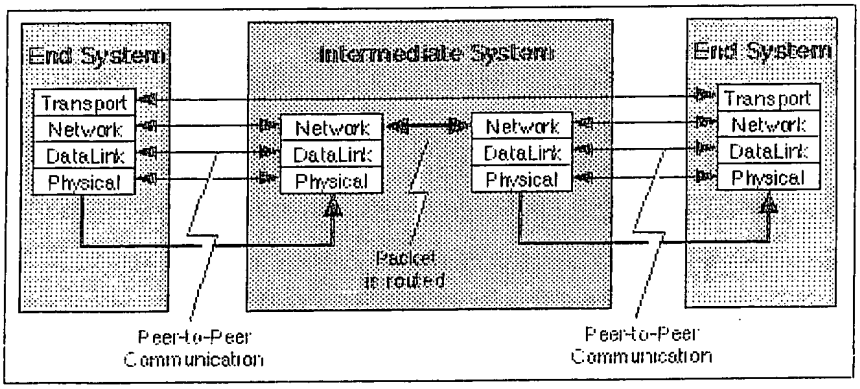
Each layer provides a protocol to communicate with its peer. When a packet is transmitted by a layer, a header consisting of Protocol Control Information (PCI) is added to the data to be sent. In OSI terminology, the packet data (also known as the Payload) is called a Protocol Data Unit (PDU). The packet so-formed, called a Service Data Unit (SDU) is passed via a service access point to the layer below. This is sent using the service of the next lower protocol layer.




*Peer to peer communication using the services of a lower layer*

The figure below provides an example of the OSI reference model supporting peer-to-peer communication between two End Systems (ES). In this case, the transport protocol entities communicates end-to-end using the services of the network layer below. The peer-to-peer communication takes place between the end systems using a communications protocol.

In the case of the link layer, the communication takes place using the service of the physical layer. The communication takes place with the peer data link layer protocol in the next directly connected system (either an Intermediate System or an End System).



*Peer-to-Peer communication between OSI protocol layers*

A more detailed example of the interaction between OSI layers is provided in an example.

*Gorry Fairhurst - email:G.Fairhurst@eng.abdn.ac.uk - Date: 01/01/2004 [illegible]*

## 4.4 Class-Opt-3 (Peer-to-Peer Communication)

### 4.4.1 Function

The peer-to-peer communication is based on TCP. Before communication, one peer-to-peer communication path (TCP connection) must be established. When AP requests for transmission, a message is sent to the specified target node. Before the TCP connection can be used, an IP address and connection port number must be configured appropriately for each target node.

This communication method is useful when data must be sent securely to the target node on the one-to-one basis or bulk data transmission is required over a peer-to-peer communication path.

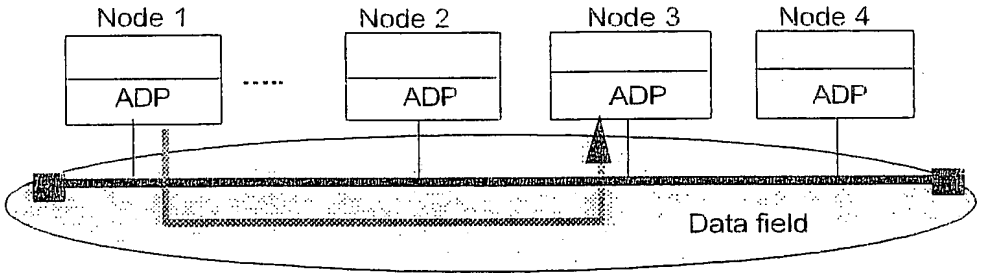



**Figure 21 Peer-to-Peer communication**

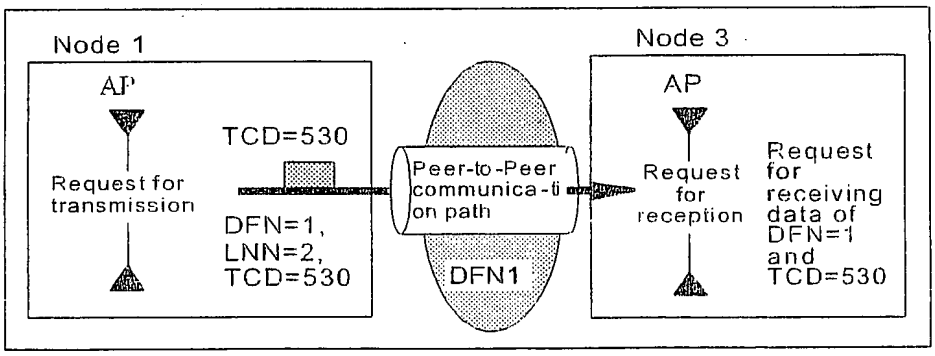



**Figure 22 Peer-to-Peer communication path and transmission/reception**

Peer-to-Peer communication positions upper of TCP. TCP between nodes transfers a transmitted peer-to-peer communication message through a TCP connection.

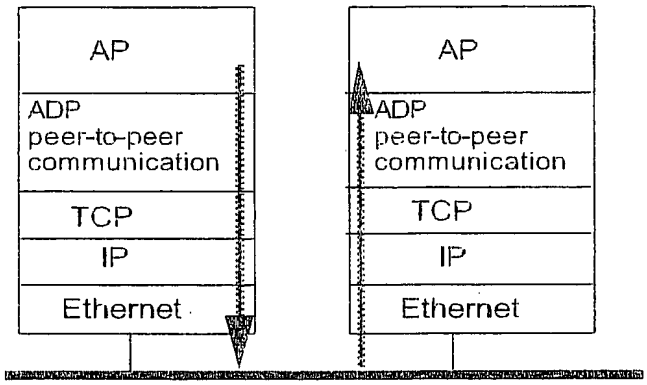



**Figure 23 TCP-based communication**

### 4.4.2 Managing TCP Connection for Peer-to-Peer Communication

#### 4.4.2.1 Connection and Assigning TCP Port Number

For a peer-to-peer communication, a TCP port unique within a node must be assigned. When a peer-to-peer connection is established, a TCP port number defined between the two nodes is used.

Example:
Assuming that node 1 wants to connect to nodes 2 and 3 respectively. For each of the connections, an IP address to the target node number and a target TCP port number are necessary.

As the connection information between nodes 1 and 2, IP addresses IP1 and IP2 and TCP port numbers 10000 and 20000 are used. For nodes 1 and 2 connections, the four pieces of information must be defined respectively.

Before a connection can be established, the requester and receiver of the connection request must be specified. The requester may fail in establishing a connection due to any cause such as an inactive target node, however the requester should be able to retry requesting periodically. As a connection established, peer-to-peer communication becomes available.